NavMed 369

UNITED STATES NAVY

MEDICAL NEWS LETTER

Rear Admiral Bartholomew W. Hogan MC USN - Surgeon General
Captain Leslie B. Marshall MC USN (RET) - Editor

Vol. 31 Friday, 24 January 1958 No. 2

TABLE OF CONTENTS

Policy

The U. S. Navy Medical News Letter, is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

* * * * * *

Digitalis Intoxication

Several authors have reported an increasing incidence of mild and severe disability in their cardiac patients associated with the use of digitalis preparations and presumably due in many instances to misuse of the drug—this despite abundant recent warnings in the literature about the increased hazard of rapid digitalization, the need for careful follow-up of patients who are being digitalized with frequent readjustment of dosage, and the danger of free use of digitalis under certain limiting circumstances, the most notable being advanced and advancing congestive failure. It is commonly offered that the range between therapeutic and toxic doses is narrow; this cannot be doubted. On the other hand, DeGraff points out that many physicians give such a small dose that it is practically useless. "We must be sure that the patient has just enough digitalis, that he is neither under--digitalized nor toxic.". The premise of this report is that this is usually possible.

Forty selected cases of digitalis intoxication were studied, especially with regard to the etiology of toxicity in terms of correctable human error. Definite clinical criteria were applied to exclude doubtful cases. Age was not found to be a barrier to effective therapeutic exhibition of digitalis. The type of heart disease was not significant when compared to nontoxic controls. Acute myocardial infarction, however, seemed to predispose to development of toxicity in three cases.

The occurrence of signs of intoxication without symptoms was not a factor in the etiology of toxicity in this group, probably because of selection of more severe cases. There was evidence, however, that digitoxin produced more severe toxicity with fewer warning gastrointestinal symptoms than did digoxin. Nausea and vomiting were by far the most prominent symptoms, but anorexia may often be missed as an early symptom of intoxication.

"Neurologic" symptoms are again emphasized as a common manifestation of digitalis intoxication, but these were usually accompanied also by gastrointestinal symptoms in this series of patients. Ninety-three percent of cases in this series were found to have pulse irregularities; bradycardia was found in 25%. The average P-R interval was 0.23 seconds in the intoxicated group as compared with 0.19 seconds in nontoxic controls. The presence of "digitalis effects" by ECG was not a significant criterion of the presence of, or severity of, intoxication. Arrhythmias by ECG were present, however, in 95% of cases. Auricular fibrillation was attributable to digitalis intoxication in only 3 of 14 cases reported with this arrhythmia and was accompanied by other arrhythmias in 11 of these 14 cases. Bigeminy was present in 25% of cases of intoxication. Sixty percent of patients with bigeminy also had auricular fibrillation. Only 20%, however, were associated with known rheumatic heart disease.

Six cases of refractory heart failure are reported, five of whom improved with the withdrawal of digitalis. Failure to attribute advancing congestive heart failure to digitalis intoxication may be a serious and not uncommon error. It is felt that when clinical signs and symptoms are compatible with both congestive heart failure and with digitalis intoxication and if the congestive failure has not previously responded to adequate digitalis dosage, benefit will often be obtained by stopping or reducing dosage of digitalis rather than increasing dosage to the point of toxicity or by exhibiting potassium or procainamide.

A classification of etiology of digitalis intoxication is suggested which is based on correctable human error in the use of the drug. Eighty percent of cases here reported were believed to have been preventable by attending physicians; 88% of these could be attributed to errors in dosage. A common error responsible for nine cases (23%) of toxicity was an attempt to control intractable failure by exhibiting high-maintenance dosage or by adding frequent small supplementary doses to an already adequate maintenance dose. It is suggested that many of these patients may have evinced increased signs and symptoms of failure as a result of, as well as in spite of, augmented digitalis dosage. If dosage is to be increased in such cases, it is suggested that frequent ECG's and careful observation—preferably in a hospital—be performed in order to spot early signs or symptoms of intoxication. Small increases of dosage are especially hazardous in patients with any of the well-known limitations to digitalis therapy, namely, poor myocardial status, electrolyte imbalance due to diuresis and congestive failure, acute myocardial infarction, pulmonary embolism, severe kidney disease (especially with oliguria), and advanced liver disease.

A common and insidious error was the failure of physicians to frequently follow-up patients who were receiving relative normal maintenance dosage of digitalis preparations. The follow-up was inadequate to individualize these so-called "normal" doses and especially to reevaluate patients' dosage on the

basis of advancing congestive failure and other criteria already mentioned which may predispose to digitalis intoxication. The most frequent offending dosage in this series was 0.2 mg. of digitoxin daily and 0.5 mg. of digoxin daily; but toxicity developed in patients receiving 0.15 and even 0.1 mg. of digitoxin. Individualization and reevaluation of dosage are emphasized.

Electrolyte imbalance was prominent in eight cases in this series, but in only four of these (10%) could electrolyte imbalance be primarily indicted for the occurrence of toxicity. Two cases of toxicity associated with intravenous Ca therapy are reported. One resulted in sudden death. Diuresis was common, but was believed to be primarily responsible for the development of toxicity in only four cases (10%). Infusion of hypertonic saline probably precipitated intoxication in one case.

The potential gravity of the syndrome of digitalis intoxication is emphasized. Finally, the results of therapy with oral potassium and by discontinuation of digitalis are evaluated. In a small number of cases, the average time for disappearance of symptoms or signs due to digoxin was 2 to 3 days; with digitoxin, 9 to 11 days. (Shrager, M. W., Digitalis Intoxication: Arch. Int. Med., 100: 881-892, December 1957)

* * * * * *

Antibiotic Sensitivity Testing

Routine methods for testing drug sensitivity of microflora in secretions aspirated at bronchoscopy appear to be impractical because reports cannot be obtained for 36 to 48 hours. Patients are often hospitalized for short periods and relatively little time is available for aerosol therapy or other treatment with effective drugs. Furthermore, present techniques for determining drug sensitivity of bronchial microflora often favor an over-growth of extrinsic microorganisms not responsible for the pathological condition while the more delicate pathogens are excluded. Inaccuracies in determining drug sensitivity often result from these procedures and a poor correlation between laboratory reports of drug activity and in vivo effectiveness is observed.

The method here reported reduces the time required for sensitivity testing to 12 to 24 hours and permits better growth of the microflora responsible for the pathology observed. Consequently, it is possible to initiate drug therapy soon after the patient is bronchoscoped and thus maintain treatment for a longer period of time with drugs specific for the infection. The method is economically feasible for the patient and may be employed at no greater expense than routine laboratory procedures.

The Direct Dilution Method appears to have several advantages over routine sensitivity testing techniques. Using this method, the microflora of the bronchial secretions are immobilized in the solid medium. This

condition permits their growth in proportion to the frequency of their occurrence in the specimen; consequently, the more fastidious pathogens have an opportunity to develop without being overgrown by more rapidly metabolizing organisms of a saprophytic or nonpathogenic status. By the routine method, on the other hand, the rapidly metabolizing organisms may overgrow the culturally delicate pathogenic bacteria in the brain-heart medium. As a result, sensitivity tests conducted by this method may indicate drug response of organisms not actually involved in the pathological condition rather than drug sensitivities of the flora responsible for the infection. Thus, the more economical drugs, such as penicillin, often are not recommended for conditions where these drugs frequently would be effective.

Reduction of the time required for sensitivity testing by the Direct Dilution Method is of importance in permitting early initiation of appropriate drug therapy. Accurate results can be obtained in 4 to 24 hours because the evaluation may be made on the basis of changes in the blood medium due to the metabolic activity of the microflora, i.e., hemolysis, opacity, et cetera, and may be observed prior to the appearance of detectable macroscopic bacterial colonies. Reports such as those of Rammelkamp and Maxon, Schmidt and Lester, Gezon, and others have inferred that penicillin is becoming an unsatisfactory therapeutic agent in the treatment of respiratory infections. The authors agree that it has lost some of its original effectiveness due to the development of penicillin resistant bacteria; however, the relatively close correlation between results obtained with the Direct Dilution Method of sensitivity testing and the clinical response indicates that penicillin is still a highly effective agent in the treatment of many such infections. Because this method is no more complex than routine techniques and requires only the usual laboratory materials and media, it may be employed as economically as other methods currently in use. The method is also applicable in testing sputum specimens, although it must be recognized that the unavoidable contamination of the specimen by mouth organisms may render the results less accurate.

A new Direct Dilution Method which is more rapid and permits a more accurate evaluation of drug effectiveness is described for the sensitivity testing of bronchial flora. The steps of the procedure are: (1) Homogenize one part of bronchial secretions with three parts 5% dextrose water. Amounts may be varied depending on the viscosity of the secretions. (2) Incorporate up to 10 cc. of homogenate into 125 cc. of tryptose blood agar base containing 5 cc. of defibrinated blood at a temperature of 45° C. (3) Mix well and distribute into petri dishes (six for above amount). Allow to solidify and apply test discs ("Multidiscs" - Case Laboratories). (4) Incubate at 37° C. and read at 4, 12, and 24 hours. (5) Measure from the periphery of the test disc to the initial growth zone and report in mm. The reading is based on the visible indications of bacterial metabolism in the media (i.e., hemolysis, turbidity, et cetera).

The method overcomes certain disadvantages encountered in routine methods of testing and has been found to be as economical for the patient as methods currently employed. The data presented would indicate that penicillin is still a highly effective antibiotic in the treatment of respiratory infections. Careful clinical observations tend to corroborate the accuracy of the laboratory results. (Brown, J. R., Waterman, D. H., Woodward, J. M., A New Method for Antibiotic Sensitivity Testing of Bronchial Flora: Dis. Chest, XXXII: 678-681, December 1957)

* * * * * *

Sporotrichosis

Sporotrichosis is an infectious granulomatous disease of fungous origin occurring most commonly in an upper extremity. Although the disease usually involves skin and subcutaneous tissue, it has been reported rarely in bones, joints, muscles, synovial membranes, the central nervous system, mucous membranes, and viscera. If sporotrichosis is diagnosed, it can usually be cured; in fact, no other deep fungous infection responds more readily to treatment. If unrecognized, the disease will not spontaneously regress and a chronic disability will result.

In the present series of twenty-three patients with involvement of an upper extremity, the age range varied from 16 to 74 years with an average of 42 years. The youngest patient to be reported in the literature was 16 months of age; the oldest was 71. In this series the distribution was 12 men and 11 women. All races seem to be equally susceptible.

Sporotrichosis, as pointed out by Foerster, is to an extent an occupational disease, frequently occurring among people who work with soil and vegetables. In this group, farmers, laborers, and florists are commonly affected. With this in mind, the authors believe that more attention should be given to sporotrichosis as a compensable disease. Some have reported compensable cases in New York State; Singer and Muncie reported infection in workers on flower-bulb farms where salt marsh hay was used as mulch. Gastineau and associates have reported infections occurring in florists who used various fertilizers. Foerster reported fourteen cases resulting from injury and infection by the Japanese barberry bush. In the present series, seven patients were housewives in most of whom infection occurred after an injury while working with thorned flowers; there were five farmers, five florists, one laborer, one carpenter, one clerk in a grocery store, one stenographer, one cashier in a clothing store, and one manager of an automobile agency.

Only nine (43%) of the twenty-one patients had primary lesions of the skin (two patients had systemic infections with no primary lesion ever being found) recalled a specific injury at the site of the subsequent primary cutaneous

lesion. Three pricked a finger on a rose thorn, one cut a finger with a knife, one scratched an arm on a raspberry bush, one on a cornstalk, and one on a Japanese thorned shrub, while one abraded a hand on a leather strap, and one was injured by a sliver of wood in a wrist.

Sporotrichosis manifests itself in various forms. The classic work of deBeurmann and Gougerot described the disease as composed of one or more of six different clinical types: lymphatic, disseminated, epidermic, mucosal, skeletal, and visceral. Smith and Garrett have added a seventh type, sporotrichotic dermatitis.

In twenty-one of the twenty-three patients, the disease began as the localized lymphatic type; in one of these twenty-one cases, it progressed to the systemic type. Thirteen (65%) of the primary lesions occurred in the right upper extremity. Eleven of these occurred on the dorsal or volar aspect of the hand. Three lesions occurred on the volar aspect of the left forearm. The localized lymphatic form may be cutaneous or subcutaneous. The cutaneous form is characterized by ulcers, nodules, gummata, and abscesses, with the primary lesions occurring at the site of injury. The wound of entry may be a previous one which is later contaminated by the organism or the initial injury may introduce the organism by a contaminated thorn, for example. From 20 days to 3 months may elapse following inoculation before appearance of the primary lesion.

The primary lesion may begin as a small abscess at the site of trauma. The abscess enlarges to form a nodule which is at first semisolid, spherical, freely movable, and nontender. It then becomes attached to the skin which is first pink, gradually becoming violaceous. The nodule forms a fluctuant center and ruptures spontaneously, forming a granulomatous ulcer which bleeds easily and tends to crust. The ulcer may heal spontaneously or it may remain open and is then known as the primary chancre; this may persist for months. Only three cases have been reported in the American literature in which the disease has remained in this localized form. Commonly, within a few days to a week after the appearance of the primary lesion, the fungus spreads through the lymph channels to produce an ascending chain of secondary subcutaneous nodules. The lymph channels may appear as firm cordlike painless structures. The nodules may number from 3 to 40 or more. These nodules are freely movable and painless. Later, they become attached to the skin. They may also soften and ulcerate, discharging a small amount of thin, watery secretion. Secondary lesions vary in appearance in the same case based on the evolution of the disease process, nodules and ulcers appearing simultaneously. The secondary lesions, unlike the primary lesion, may persist for months or years if the disease is not treated. As a general rule, in the localized form the general health is not affected.

The second group or gummatous disseminated type is rarely seen in this country, but commonly encountered in France. None of the authors' patients were in this group.

The third group is the extracutaneous or systemic group. Three cases were of this type. Fortunately, the systemic group is uncommon for these cases are perplexing diagnostically as well as therapeutically. The systemic group is discussed in detail with brief summaries of the three cases. It is considered appropriate to mention that the granulomatous lesions may appear in muscles, bones, joints, and synovial membranes. In bone, the lesion may appear as periostitis or osteomyelitis. Spontaneous fractures have been reported and Gougerot stated that bone is affected in approximately 10% of systemic cases.

The average time from onset of the disease to diagnosis in the present cases was 3 months, the longest period being 6 months. This time interval can be shortened by more acute awareness of the clinical features in this disease.

Sporotrichosis should be considered a chronic illness in which cutaneous or subcutaneous nodular lesions suggesting lymphatic dissemination appear without the usual inflammatory signs of bacterial infection. The disease is seen most commonly in an upper extremity. The diagnosis is established by demonstration of the causative organism, Sporotrichum schenckii, following the outlined culture technique. An adjunct to the diagnosis may be animal inoculation, although this is usually not necessary. Complement-fixation or agglutination tests are not specific because they often give false-positive results. An intradermal skin test has been used and is primarily of value in that a negative reading rules out sporotrichosis, but false-positive readings may also occur.

Although eosinophilia has been suggested as being present in some cases, the authors were not able to confirm this finding in cases reported here. An elevated sedimentation rate was present in the three systemic cases with leukocytosis in one of these. Leukocytosis was present in one of the localized lymphatic cases in which secondary bacterial infection was superimposed.

Sporotrichosis must be differentiated from tuberculosis, syphilis, pyogenic infections, tularemia, coccidioidomycocis, North and South American blastomycosis, histoplasmosis, squamous-cell epithelioma, and granulomata caused by drugs.

Potassium iodide remains the drug of choice for treating the localized lymphatic form of sporotrichosis. It is also of value in all other forms except central nervous-system involvement. In the systemic type, 2-hydroxystilbamidine may be helpful.

The prognosis in the localized lymphatic type of sporotrichosis is excellent. The authors found that the duration of time from onset to diagnosis in this type did not influence response to treatment. The average time for complete healing was 7.4 weeks, the shortest, 2 weeks. The only factor which did seem to influence healing in this type was delay of complete treatment due to drug reaction. This occurred in five patients; after a temporary discontinuance of the drug in three of these patients, they subsequently

recovered with potassium iodide therapy. Evidence was not found that a second course of the drug was less effective than the first, as has been reported.

The prognosis for the systemic group is more guarded. It is particularly grave in fulminating, disseminated forms with involvement of the viscera and of the central nervous system. (Duran, R. J., et al., Sporotrichosis - A Report of Twenty-Three Cases in the Upper Extremity: J. Bone & Joint Surg., 39-A: 1330-1339, December 1957)

* * * * * *

Diagnosis and Treatment of Muscular Dystrophy

Advanced muscular dystrophy of the classic type is such a striking disorder that it is seldom difficult to recognize. Its inevitable progression affords little chance of effective therapy. Nevertheless, the forms of the disease with better prognosis and the close simulation of several more benign and treatable conditions to muscular dystrophy make it necessary to define it closely.

The general features of muscular dystrophy are a slowly progressive loss of use of symmetrical groups of muscles and atrophy of those muscles. All forms have a hereditary character which is more obvious in the severe types of the disease and may be difficult to demonstrate in the milder types. All ultimately affect the muscles of the shoulder and hip joints, but more unusual types (especially dystrophia myotonica) may begin in the distal parts of the extremities.

There are five main types:

1. Pseudohypertrophic Muscular Dystrophy (Duchenne Type). This is the most severe form of the disease. It usually begins in earliest childhood. The enormous calf muscles attract attention together with the waddling type of gait that indicates weakness and instability of lateral fixation of the hips. Weakness or extension of the hips is an early sign and the classic Gowers test is to watch the child get up after lying down.

Pseudohypertrophic muscular dystrophy is transmitted as a sex-linked inheritance affecting male children. Females—although unaffected—transmit the liability to their male offspring. Recent investigation has disclosed a "high mutation rate" or spontaneous occurrence of the disease; therefore, the absence of a family history of the condition does not exclude it.

The wasting of the muscles progresses slowly but inevitably to involve thigh, shoulder, and trunk muscles; fevers of any kind accelerate it. By the age of 15 years, the child is greatly disabled and few patients survive to reach the third decade of life.

2. Erb's Limb-Girdle ("Juvenile") Type of Muscular Dystrophy. Recent careful studies by Walton and Nattrass have confirmed that one can

consistently distinguish two disease entities among the milder types of muscular dystrophy on the basis of prognosis, heredity, and clinical state. Erb's juvenile or limb-girdle type most commonly begins in the second decade of life. In the remainder, the onset is scattered equally through all age groups up to the sixth decade. The first symptom is usually difficulty in raising the arms above the shoulders. Weakness in flexion of elbows follows after a year or two. About one-third of the patients have as the first symptom difficulty in climbing stairs due to weakness of extension of hips and knees. This is soon associated with some lateral instability of the pelvis. Weakness and wasting of trapezius and pectoralis muscles and later of biceps and brachioradialis muscles are seen in the first group; weakness and wasting of gluteus and adductor muscles and later of quadriceps in the second. Some physiologic hypertrophy of the deltoid muscles to compensate for poor scapular fixation or of the quadriceps is seen for many years before these muscles also atrophy.

Characteristically, the muscular wasting progresses slowly year by year. Lordosis, protuberance of the abdomen, and weakness of the neck eventually ensue, but are long delayed—perhaps for 20 to 40 years.

3. Facioscapulohumeral (Landouzy-Déjerine Dystrophy). The outstanding clinical feature of this type is early weakness of facial muscles. Patients commonly give a history of never having been able to close their eyes completely even in sleep and of inability to whistle or blow with the lips. The thick gaping lips give a characteristic myopathic appearance. Difficulty in raising the arms above the shoulders and abnormal shoulder posture make their appearance between the ages of 7 and 30 years, most commonly between 15 and 20 years. The weakness and wasting of shoulder muscles begin in the trapezius and pectoralis muscles, later involving the biceps and triceps, but sparing deltoid and spinalis muscles for a long period. The pelvic girdle and thighs are rarely affected. The forearms commonly are markedly hypertrophied.

4. Progressive Dystrophic Ophthalmoplegia (Ocular Myopathy). This is the mildest of the muscular dystrophies and affects only the extraocular muscles. The presenting symptom is a progressively severe bilateral ptosis of both upper eyelids beginning in middle life, associated with slowly increasing limitation of all eye movements. Pupillary reactions are unaffected. Weakness in closure of the eyes is common and often there is general weakness in facial and neck movement in later stages. Atrophy of shoulder muscles has been reported, but is rare. In most cases, there is no family history of the condition in the previous two generations.

5. Dystrophia Myotonica (Steinert's Disease). The outstanding features of this type are the tendency to muscle spasm (myotonia), early involvement of the hands, upper eyelids, and neck, and the occurrence of associated endocrine disorder (testicular atrophy) and cataract. The most common initial symptom is weakness of grip of the hands with difficulty in relaxing

a strong grasping effort. Bilateral ptosis is an associated finding. Wasting of the small muscles of the hands and forearms occurs, with atrophy of masseters and sternocleidomastoids. Ultimately, weakness and wasting of the shoulder fixators appear. Subsequent atrophy and weakness of the muscles of the neck give a characteristic swan-neck appearance. Testicular atrophy, impotence, frontal baldness (an unreliable sign), and polar opacities of the lens (easily seen with an ophthalmoscope set at + 12 diopters) are confirmatory signs. Weakness and atrophy of pretibial muscles are a rare variant of onset.

The chief value of differentiating the various types of muscular dystrophy lies in estimating the prognosis. Although each of the five varieties outlined is completely characteristic in a stage of full development, there may be confusion of types in the earliest stages. Enlargement of the calf muscles of an infant or young child is pathognomonic of pseudohypertrophic dystrophy. Its presence in late childhood or in adult life more likely represents the true hypertrophy of myotonia and carries a good or moderately good prognosis depending on the presence or absence of dystrophy or cataract in the family. Hypertrophy of deltoid or quadriceps muscles is most common in the relatively mild but progressive Erb type. Only an accurate history and biopsy will give a final decision, but marked enlargement of calf muscles in a very young male child is a bad sign.

Wasting of the musculature of the shoulder girdle may occur in all types of dystrophy. Only the age of onset, the rate of progression, and the relation to facial weakness will assess its significance.

The most useful diagnostic procedure for all types of muscular disease is muscle biopsy. It will give a highly accurate diagnosis not only of dystrophy, but also of myositis and neural atrophy.

Biochemical tests are not useful as routine diagnostic measures in muscular dystrophy. Creatinuria can occur in dystrophy as in other conditions of large reduction in muscle bulk, but it is greatly variable and a simple urine estimation neither proves nor disproves a diagnosis. Ribosuria likewise is not a clinically useful finding. Transaminase levels are raised in any type of muscular destruction, especially if active and recent. Other than biopsy of muscle, there is no diagnostic test for any of these conditions.

In the absence of knowledge of the cause or mechanism of muscular dystrophy there is no specific treatment. Attempts to heighten the intake of creatine by feeding glycine, to increase the muscular uptake of creatine by feeding alpha-tocopherol, or to increase protein metabolism by feeding glycine or special amino acid mixtures have been uniformly disappointing. There is no evidence that vitamins or any known specific item of metabolism influences the condition. Tocopherols in various forms have had prolonged trials with disappointing results.

As with all muscular disorders, rational treatment of muscular dystrophy concerns the wisest management of remaining muscular function.

It appears certain that prolonged immobilization, fevers, and repeated fatigue hasten the dystrophic process. In general, therefore, one should encourage use of muscles short of production of fatigue. Any method that supports weak muscles and prevents overstretching is of value. Wearing a corset can greatly help lordosis. Mechanical contrivances to assist fixation of the scapulae are necessarily somewhat cumbersome, but well worth considering in mild or arrested types of disease if instability of scapular fixation is the only severe disability.

Accurate estimation of the impetus and momentum of the disease is not just an academic exercise. It is essential to proper management. Too often the milder or even arrested types of dystrophy are given a bad prognosis and an effort at rehabilitation is not made. (Denny-Brown, D. E., Diagnosis and Treatment of Muscular Dystrophy: Postgrad. Med., 22: 558-565, December 1957)

* * * * * *

Esophageal Hiatus Hernia of the Diaphragm

Hernias through the esophageal hiatus received little attention until recently and are still poorly understood by many physicians. The anatomy is inadequately described in many standard texts and the symptom complex which results from the disturbed physiology of swallowing is frequently misinterpreted. As was the case with inguinal hernias 60 years ago, most physicians still hesitate to suggest operation for a hiatal hernia even when it has been recognized to exist, feeling that it is a common incidental finding of little significance and attributing its symptoms to other causes, or finding none, to neurosis. Only when obviously incapacitating complications develop is repair resorted to, and even then with misgivings because the risks of the procedure and the likelihood of recurrence are thought to be high.

There is now no longer need for these misunderstandings, misinterpretations, hesitations, or misgivings. Careful anatomic reviews have made clear the anatomy of the esophageal hiatus in the diaphragn, demonstrating its considerable individual variations and indicating the part it plays in holding the gastric cardia in place and controlling reflux from the stomach into the esophagus. The more complex intrinsic mechanisms of closure of the gastric cardia have also been extensively studied. Although here the findings of anatomist, endoscopist, and roentgenologist are more difficult to correlate, there is general recognition that incompetence of the cardia follows if, sliding through the hiatus, it loses its acute angle of entrance.

When a hernia occurs through the esophageal hiatus, a number of factors are present. The difference between intra-abdominal and intra thoracic pressure is one factor. Increased intra-abdominal pressure due to

obesity, pregnancy, or the acute increase of a sudden blow appears to play a real part in increasing a herniation once it has begun, although it may be questioned as an original cause. Similarly, the inherent tendency of the esophagus to shorten, and the sucking effect of the inspiratory phase of respiration are secondary factors. Congenital variations in the construction of the crural sling, or weakening of the fibers with age, seem more likely original factors in the common sliding hernia. A pre-formed peritoneal sac—sometimes called the infracardiac bursa and considered to be a persistence of the pneumatoenteric recess of the embryo—may protrude upward through the hiatus and predispose to paraesophageal hernia. Finally, the length of the esophagus is a factor. In the usual sliding hernia, the esophagus becomes shortened secondarily. In rare instances, the esophagus may be congenitally short. In this case, the stomach has never fully descended below the diaphragm. Rarely, there may be no crural fibers between the esophagus and aorta—a condition termed "esophago-aortal hiatus hernia."

All of these anatomic factors contribute to the formation of a hiatal hernia. The etiological significance and importance of each factor vary in different cases. Successful repair depends upon knowledge of the varied anatomic types, the ability of the surgeon to recognize and deal with each, and an understanding of methods to prevent gastric reflux.

There are three main types of acquired hiatal hernias. The first—and by far the commonest—is the sliding hernia. The second type is the paraesophageal. The third type is the combined or composite hernia which is a combination of the first and second.

The characteristic symptoms of hiatal hernia of the sliding type are related primarily to reflux of stomach contents into the esophagus. They consist of heartburn, substernal and epigastric pain, a pulling sensation in the throat, and episodes of sudden choking, especially when recumbent at night. In severe cases, the patient may find sleep possible only in a chair. Bending forward or stooping causes severe distress. If secondary esophagitis is present, dysphagia may be extreme or hematemesis may be the presenting symptom. Extreme aerophagia and belching are frequent. The symptoms are often confused with those of cholecystitis and angina and when these can be excluded they may be attributed to "bolus hystericus." These unfortunate patients often suffer for many years seeking help from many doctors and developing an overlay of functional symptoms that obscures the true cause of their difficulty more and more. Chronic esophagitis with or without actual peptic ulceration which then occurs may present additional difficulties both in diagnosis and treatment. In the ordinary case, vomiting is rare and the patient is usually obese belying the complaints of difficulty in eating or "indigestion." It should be emphasized that these sumptoms are unrelated to the size of the hernia.

In paraesophageal hernia, dysphagia and digestive symptoms are less frequent because the cardia is competent. It seems paradoxical that many

patients with these sometimes huge herniations are relatively free of symptoms, whereas those with apparently insignificant or "incidental" sliding hernias may be almost incapacitated. When paraesophageal hernias do cause symptoms, it is often due to pressure on the heart or lungs. These hernias occasionally become incarcerated with acute gastric obstruction and enormous dilatation—a complication which never occurs in sliding hernias. On the other hand, acute hemorrhage is rare.

The true congenital hernias may result in intractable vomiting in infancy. When this is not the case, later symptoms due to gastric reflux may occur as in sliding hernia so that in adults the differential diagnosis may be impossible until operation.

When extreme symptoms of obstruction, hemorrhage, or progressive incapacitating dysphagia are present there is little question that operation is necessary. But it may be hoped that with increasing understanding of the earlier symptoms and the safety and efficacy of repair, fewer patients will be allowed to reach this stage. There is no question that if suggestive symptoms occur in the presence of a radiologically demonstrable hernia and in the absence of any other lesion which might be responsible, operation should be done. Many small hernias, however, apparently cause little or no symptoms. At present, it is not generally accepted that these should be repaired, but it is not known how many may eventually become symptomatic. The time may come when the mere presence of such a hernia will be sufficient indication for repair in the absence of definite contraindications as is now the case with inguinal hernia. (Humphreys, G. H., Ferrer, J. M. Jr., Wiedel, P. D., Esophageal Hiatus Hernia of the Diaphragm - An Analysis of Surgical Results: J. Thoracic Surg., 34: 749-754, December 1957)

* * * * * *

Surgical Treatment of Duodenal Ulcer

Duodenal ulceration in the young adult presents a complex problem in medical and surgical therapy. The ulcer symptomatology and course of the disease usually can be controlled by conservative means. However, medical management fails in a number of young adult patients despite long and thorough treatment. This is due to the severity of the disease in some and failure to cooperate in others. In such instances, operative intervention must be considered despite the potential danger of postoperative "dumping," malnutrition, anemia, or marginal ulceration.

This is a report of 151 patients who were 35 years of age or younger at the time they were subjected to operation for duodenal ulcer disease. There were 127 males and 24 females in this series—a ratio of 5.3 to 1. The youngest patient was 13 and the oldest 35 years of age. The age distribution is presented in a table.

Seventy-eight patients (52%) had ulcer symptoms that antedated operation by at least 5 years. As might be expected, the patients who were 25 years of age or older tended to have longer periods of illness before operation. Fifty-six (37%) had symptoms from 1 to 5 years and only 17 (11%) had symptoms for less than 1 year before they were subjected to operative treatment. There did not appear to be significant difference in the duration of symptoms between the patients according to type of operation or sex.

The primary indications for operation have been grouped into the customary categories of pain, bleeding, obstruction, and previous perforation. Perhaps some of the indications which were employed in the early part of this series, especially for the performance of gastrojejunostomy, would not be accepted by present standards. Pain was an indication for operation in those patients who had had an intensive medical regimen without relief of symptoms. However, there were a few patients who now would not be considered to have had adequate medical treatment prior to surgery. These were encountered during the earlier years which are covered in this study.

Pain and bleeding occurred with approximately equal frequency as indications for surgery in the entire series. However, of the patients who were subjected to partial gastrectomy, 47% were operated upon for hemorrhage, while among the group who were treated by gastrojejunostomy, only 11% had bleeding as an indication. Pyloric obstruction was the primary indication for operation in 19% of the entire series. This was comprised of 12% of the patients who had a partial gastrectomy and 39% of those who had gastrojejunostomy.

The operative procedures which were performed upon the 151 patients included partial gastrectomy in 97 patients. Seven of these had, in addition, a subdiaphragmatic vagotomy. The type of anastomosis which was employed has been determined and is presented in a table. Forty-four patients had a posterior gastrojejunostomy. Other procedures were performed in 10 patients. These were: vagotomy in five; and in one instance each, gastrojejunostomy with vagotomy, gastrojejunostomy with excision of the ulcer, pyloroplasty, pyloroplasty with vagotomy, and ligation of a bleeding vessel and approximation of the ulcer.

There are few reports of the results of treatment of the young adult patient with duodenal ulcer. Certain discrepancies have appeared in recent articles which have discussed the results of surgical therapy in this group. Clark showed a significantly higher incidence of "relapses" in patients less than 30 years of age who were treated by posterior gastroenterostomy. However, Hoerr and associates stated that age was not an important factor in the development of marginal ulceration. A study of the results after partial gastrectomy by Pulvertaft is in agreement with this latter finding.

Results of the present study demonstrated a high incidence of recurrence in patients 35 years of age or younger who were subjected to posterior

gastrojejunostomy or partial gastrectomy. Previous reports from this institution have indicated that about 25% of patients can be expected to develop recurrent symptoms after posterior gastroenterostomy and that gastric resection is associated with satisfactory results in approximately 87%. These findings are in marked contrast to occurrence of recurrent ulceration in 52% of the young adults who were treated by gastrojejunostomy and 24% of those who were subjected to partial gastrectomy.

It would appear that this augmented incidence of ulceration after gastric operation reflects the severity of the ulcer diathesis in the young patient. This premise is supported by the observation that hemorrhage was an indication for operation in a remarkable proportion of the patients in the series.

The magnitude of unsatisfactory results in youthful persons emphasizes the importance of intensive efforts to manage the ulcer disease in this group. Operations should be resorted to only when they become mandatory. It would appear from the analysis of the patients in the present report that a resection of two-thirds or more of the stomach affords the young adult the best protection against recurrent ulceration.

From the present study, it would appear that the recurrence rate in the young adult who is subjected to operation for duodenal ulcer is higher than that usually associated with these operations. (Johnson, G., Sleisenger, M. H., Beal, J. M., The Surgical Treatment of Duodenal Ulcer in the Young Adult - A Review of 151 Patients: Ann. Surg., 146: 970-975, December 1957)

* * * * * *

Excessive Oozing in Surgical Patients

Generalized oozing from small blood vessels in the operative field may occur during surgery. Usually, it is short-lived and minor in degree. On other occasions it may be excessive and prolonged or intractable. The cause is not well understood. Massive blood replacement, a demonstrable circulating fibrinolytic enzyme, hypo or afibrinogenemia, and platelet deficiencies have all been suggested as the cause.

A number of factors concerned with blood clotting and fibrinolysis have been measured before, during, and after surgery. An attempt has been made to correlate changes in these factors both with the occurrence of excessive oozing during surgery and with the number of transfusions administered.

Although the occurrence of fatal hemorrhage in obstetrics and surgery is rare, episodes of excessive bleeding during massive surgery are not uncommon. In this series, oozing occurred in 15 of 78 patients. Only 4 of the oozing patients received over 10 units of blood and in one of these, the transfusions were the result rather than the cause of the excessive bleeding. Hence, massive transfusion was not a cause of oozing in most of the patients.

Thrombocytopenia following massive blood replacement has been reported by Stefanini and associates and by Krevans and Jackson. The authors

observed profound falls in the platelet count after less than 8 units of blood, and always after the administration of 10 or more units. The percentage reduction in count was approximately the same as in the patients studied by Krevans and Jackson. However, only two of the present patients had platelet counts below 100,000 /c.mm. after transfusion. One explanation for the lack of thrombocytopenia in the authors' cases was the high pretransfusion platelet count in many of these patients. Another is that Krevans and Jackson reported the lowest platelet count within 48 hours after transfusion, whereas the authors report the count within a few hours. The platelet count generally continues to fall for one or two days after blood replacement. Thrombocytopenia did not appear to be a significant factor in the etiology of oozing in this series, although there was a tendency for a greater depression of the platelet count.

Although "citrate intoxication" has been discussed repeatedly since the advent of the modern blood bank, there has been little or no clinical study of the correlation between blood citrate levels and oozing. In this series, patients showed an oozing tendency with and without elevated blood citrate levels. Some patients with markedly elevated citrate levels did not ooze. There was no evidence from the present studies that elevated citrate concentration affected blood clotting. Presumably, the administration of calcium salts and the mobilization of body calcium stores adequately maintained ionized calcium.

Results of this study suggest that two criteria should be observed in an attempt to assess the relationship between fibrinolytic activity and excessive surgical bleeding. First, samples should be drawn during the period of active bleeding, because fibrinolytic activity often disappears when oozing ceases. Second, frequent samples should be obtained; because of the rapid fluctuations in fibrinolytic activity, a single sample may give misleading results.

The authors conclude that no single factor is responsible for excessive bleeding during surgery. In fact, there was a statistically significant relationship between the occurrence of excessive bleeding and the presence of multiple changes in the factors studied. Fibrinolytic activity was the change most frequently associated with oozing, but fibrinolysis was sometimes present without obvious oozing and was occasionally absent. In most of the patients who oozed excessively, some change in addition to fibrinolysis was noted, usually a decrease in fibrinogen, prothrombin, factor V, or factor VII. Although these clotting factors may have been destroyed by the fibrinolytic enzyme, similar decreases were observed in patients without detectable fibrinolytic activity.

Multiple deficiencies were also found in two patients with severe oozing. They are not included in this series because of lack of control data. Both whole blood and euglobulin fibrinolytic activity were pronounced in these patients. The fibrinogen level was low normal, but prothrombin, factor V, and factor VII, and platelet levels were below normal.

Therapeutic measures are difficult to assess because both lysis and oozing may cease without treatment. The authors have used lyophilized fresh (antihemophilic) plasma largely because many of the samples tested had very high antifibrinolytic activity. It also contains prothrombin, factor VII, and fibrinogen in approximately normal concentration, but there is a subnormal concentration of factor V. Fresh whole blood collected in plastic bags is recommended when thrombocytopenia is present and fibrinogen (fraction I) should be given when severe hypofibrinogenemia occurs. (Zucker, M. B., at al., Generalized Excessive Oozing in Patients Undergoing Major Surgery and Receiving Multiple Blood Transfusions: J. Lab. & Clin. Med., 50: 849-859, December 1957)

* * * * * *

"Little America Station, Antarctica"

(The following information is abstracted from a letter written by Captain T. D. Slagle MC USNR, Medical Officer, Naval Support Unit #3 in Antarctica)

" On September 23rd, 1957, I sailed on the USS Glacier (AGB-4), our largest icebreaker, for the deep South. We stopped at the oil docks on Staten Island to take on aviation fuel, then out again and on our way.

We passed within sight of San Salvador Island, first landing place of Columbus (?) and on between Cuba and Haiti, down to the Panama Canal. Had a slow and rainy passage through the big ditch and anchored at Rodman Base, Balboa, Canal Zone, the same night, 30 September.

The following day, went to and through Barro Colorado, an island in Gatun Lake that is being preserved in its natural state to protect the animals and plants that were there when the lake was filled to make the canal. We saw monkeys, honeybears, armadillos, toucans, many kinds of ants, butterflies, birds and strange and beautiful plants in the natural jungle.

The next day, got under way for the long trip to New Zealand, with delays planned to launch "rokoons" and scout the Antarctic ice pack, with expected date of arrival in Christchurch, New Zealand, November 10.

We sailed westward just north of the equator while IGY scientists launched the rokoons that were a part of the IGY program and the reason for the ship taking that course. Dr. James Van Allen, head of the Physics Department of the University of Iowa, and his associate, Larry Cahill, have as their project, sending up large polyethylene balloons carrying rockets with scientific instruments to an altitude of 75,000 feet where the rockets were fired by a barometric fuse and the thin air gave

little resistance and allowed the small rockets to rise to 75 miles. During the whole flight, the instruments radioed signals giving information on cosmic radiation and the earth's magnetism.

A crew member developed encephalitis a few days after we left the canal and were just about as far away from hospitals as it is possible to be. Although he was in critical condition for a few days, he improved and was transferred to our allies, the British, at Christmas Island. They flew him on to Pearl Harbor.

On October 18, we crossed the equator and had the usual initiation ceremony. Our course was directly south after crossing the equator. We made frequent stops to launch rokoons and once we paused at Suvarov Atoll while our helicopters made one of their frequent practice flights to the string of islands. There they found a couple on a small sailing boat that had been cruising around the Pacific for the past two years. Oddly enough, the little ship had passed through the Panama Canal with the Glacier on the latter's first trip to Deepfreeze I in 1955.

Another interesting diversion was watching the oceanographer, Bill Littlewood, "take station." The ship would stop while Bill would let down a weighted cable to several thousand feet. At fixed intervals he attached test devices and when the depth had been reached he sent down a "messenger" that tripped a trigger on each instrument in turn. The gadget then opened a bottle, took a sample of water, resealed the bottle, and at the same time recorded the temperature and pressure. When he pulled the cable in, the water samples were checked for salinity and dissolved oxygen, and sometimes other tests. Another instrument was dragged through the water behind the ship. This torpedo-shaped device, called a bathygraph, dived as it was pulled along, recording depth, temperature, and intensity of the penetrating light.

We reached the Antarctic Circle, 66° 30'S, and the "ice pack" at the same time. The pack is a band of salt-water ice in the southern Antarctic Ocean varying in width from year to year and with the time of the season, and enclosing the Ross Sea separating it from the Antarctic Ocean. The ice varies in thickness from a mere film to many feet and blocks from "lily pad" ice to fields several miles across. Pack ice is colored orange in deeper layers by the microscopic diatoms that furnish basic food for the rest of antarctic life. There is a little red shrimp, "krill," that lives off the diatoms and in turn is eaten by penguins, seals, and fish. We saw lots of seals and penguins on the ice floes and they looked unreasonably comfortable when they came out of the water onto the ice in that cold air. When there were several miles of unbroken ice in sight, the ship sent up one of the helicopters to pick the best course since breaking thick ice slows the ship considerably and that amounts to lots of fuel when going through several hundred miles of pack.

We cruised through the pack for about a week, finding the best course for other ships and then sailed for Port Lyttelton, the seaport for Christchurch, N. Z. This port is the crater of an extinct volcano with rugged hills on three sides, in the southern hemisphere spring when we arrived, covered with green grass and bright yellow gorse and broom. Many other spring flowers including rhododendron made it hard to realize the November date.

The ship stayed twelve days in Port Lyttelton and all who could spent as much time as possible ashore enjoying the beautiful scenery and New Zealand's famous hospitality which well deserves its fame.

LTCDR R.H. (Dick) Halverson and I took the inter-island ferry to Wellington, North Island, where we were met by Bill Stephenson, a friend we had met in South Island (at Christchurch) a few days before. He took us to his home and gave us breakfast, then helped us rent a car (a Holden, Australian built General Motors - 26 HP with right hand steering wheel). We then took off for the northern part of this island, the geyser or thermal region. We saw and photographed some beautiful scenes, including sheep ranches, snow covered mountains, an active volcano, geysers, boiling mud springs, lakes and waterfalls. At Wairakei, we visited the "geothermal" where deep borings have been made and the natural steam diverted into pipes so that it can produce electricity in power plants now under construction. From there we drove on to Rotorua, heart of the thermal region and center of Maori country.

On November 22, we left these pleasant surroundings and headed for the ice. After rollling considerably for a couple of days, we reached the ice again where our rolling stopped, but our progress was slowed by the accompanying ships, the Atka, a smaller, "wind class" icebreaker and the Greenville Victory, a cargo ship, neither of which could keep up with the normal speed of Glacier. This time in the pack we transferred a patient from the Greenville Victory, which carried no doctor, to the Glacier whose medical officer ran a good sick bay and when he wished could have the help of two of us passengers who were glad of the chance to act as visiting firemen.

On this second trip through the ice pack, we took pictures of seals, penguins, killer whales and icebergs until we had passed through the open water of the Ross Sea and came to the "barrier" which is a vertical wall of ice one to several hundred feet in height from the water level to the top of the ice shelf where Little America sits waiting to become an iceberg in a few more years. At Kainan Bay there is a break in this barrier wall with a ramplike tongue of bay ice on which ships can unload and vehicles consisting of sleds drawn by caterpillar tractors can haul supplies to the base camp.

Since there were some cracks in the bay ice and it was not thought to be safe for traffic to the edge, the ships evacuated personnel to L. A. Station by helicopter and started several days of heavy work on the thick

bay ice, breaking out moorings for the ships close enough the barrier to give safe ice for the monstrous tractors that haul cargo to the camp.

The roofs of the buildings were covered with several feet of snow and with a few domelike structures extending above the white for the IGY scientists to use for making observations. A lot of antennas and telephone wires also stuck out of the snow and a few den-like openings showed the entrances to the passageway between buildings. The passageways were dark because of the snow on the skylights and the shortage of electric bulbs which were in short supply and could not be replenished until ships were unloaded. Then too, the summertime sun which never sets had warmed the atmosphere to the point that the slight warmth of the buildings was enough to raise the temperature of the lower layers of snow on the roof to the point that snow continuously melted and the water dripped through the roofs that were made to keep out the snow instead of liquid water. This water froze again in the passageways, making it a losing game to try to walk without falling. Innumerable pans, buckets, and jars were strategically placed for catching the cold drip somewhere above the neckline and Rube Goldberg design in plastic gutters were stretched from here to thar to block a line of drips and carry the water to a rubber tube or string down which it ran to a hole bored in the deck.

All the domesticated water in camp is melted snow and since mining, transporting, and melting is slow and laborious, we are enjoined against taking a shower more than once each week. This makes us thankful for cool weather. But the fact that shaving is almost a forgotten art here is a great economy—we don't need to wash our faces either because we can't see whether our faces need washing or not. So it all works out for the best.

In a few days the snow was cleared from the roofs and it got a little colder, or at least when it snows now there is not a thick enough layer to keep in enough heat to melt it and there are practically no active leaks.

Dr. Pat Unger whom I replaced had a very workable sick bay in spite of the leaky roof. He spent a few days showing me the ingenious devices he and his predecessor, Dr. Ehrlich, had worked out to make this a very serviceable if not streamlined sick bay.

Now the ships have unloaded and we have supplies again. There are light bulbs. We have had a couple of mail deliveries. The food is good. Ice has been cleared from the passageways. We are busy stowing the medical supplies that have just arrived. We have had a little work in the sick bay so that we feel useful. And then we have talked home by ham radio.

I am now "dug in" for the winter. Most of last year's people have gone, but this crew is congenial and I am sure will work together well. I miss my family and friends, but am having a wonderful time, and to each of

you, I wish the best there is, especially a Merry Christmas and a Happy and Prosperous New Year!

Thanks for this assignment.

Sincerely,
/s/ Dick
Dick Slagle"
(Capt MC USNR)

* * * * * *

Determination of Power Density at Microwave Frequencies

(This information was abstracted from a paper, Determination of Power Density at Microwave Frequencies by Robert L. Dondero, Rome Air Development Center, which was presented at the Proceedings of the Tri-Service Conference on Biological Hazards of Microwave Radiation held 15 - 16 July 1957 at the Rome Air Development Center.)

Prior to recommending the establishment of a personnel tolerance level for radio frequency (RF) energy, the feasibility and efficiency of measuring this radiation were thoroughly explored. The maximum allowable ambient level of .01 watt/cm^2 can be determined adequately in the frequency range of Air Force R/F power generators by means of standard and stock devices. The techniques will be familiar to qualified personnel working in this field.

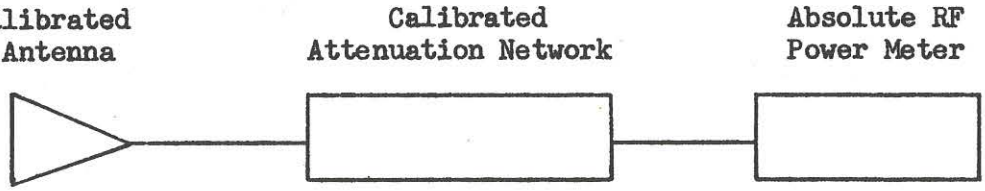
The determination of free-space power density at microwave frequencies is relatively simple and can be accomplished with a minimum of equipment if the measurement theory is thoroughly understood. Basically, the determination of power density involves probing of the RF field with microwave horns, half-wave dipoles, or some other structure of known properties and measuring the received power flowing through a point at the end of the transmission line. From this measurement the power density can easily be calculated using the following formula:

$$Po = \frac{4\pi Pr}{\lambda^2 Gr}$$

where Po = Power density = watts/cm^2
Pr = Received power = watts
Gr = Absolute gain of the receiving probe (above an isotropic radiator)
λ = Wavelength = cm

In practice, due to the nonavailability of medium-level power meters in the microwave range, it becomes necessary to use bolometer bridges and appropriate attenuating elements to decrease the "received poser" to levels acceptable to the low-power bridge. It, therefore, follows that most microwave

power density measurements can be accomplished by the utilization of three appropriately selected microwave components as shown in the following block diagram.



Each component shown above is available in one form or other to enable almost complete coverage of the microwave spectrum.

Questions regarding measuring procedures may arise from personnel unfamiliar with electronic equipment and/or without access to appropriate guidance. As a tentative aid to these personnel, the following list of equipment and frequency ranges is included.

1. Power Meters (To be used with appropriate probes (antennas))
   1 to 4 KMC: Bridge Summation - AN/URM-23
   4 to 10 KMC: Bridge Summation - AN/URM-24
   23.5 to 24.5 KMC: Meter, RF Power TS-254
   With Microwave Power Meter Hewlett-Packard Model 430C
   a. DC to 10 KMC: Thermister Mount Model 477B
   b. 8.2 to 12.4 KMC: Waveguide Thermister Mount Hewlett-Packard Type X487B
   c. 12.4 to 18 KMC: Detector, Barretter Mount Hewlett-Packard Type 485C
   d. 18 to 26.5 KMC: Wave Guide Thermister Mount Hewlett-Packard Type K487B

2. Probes (Antennas)
   Below 320 MC use calibrated dipole.
   320 to 1120 MC: Antenna As-770/URM-16
   1170 to 3400 MC: Antenna AS-771/URM-16
   3400 to 10,000 MC: Antenna AS-772/URM-16
   8.2 to 12.4 KMC: Antenna AT-156/U
   12.4 to 18 KMC: Antenna AT-157/U
   18 to 26.5 KMC: Antenna AT-158/U

The above equipment can be used to cover an appreciable portion of the microwave spectrum and it is felt that a large majority of presently available radiating systems can be analyzed by utilizing this equipment.

Briefly, the procedure for determining the free-space power density emanating from a microwave radiator is discussed as follows:

1. Pre-Measurement Procedure

   a. Select an RF antenna or probe, RF power meter and appropriate attenuating element for the frequency range of interest.
   b. Calibrate or determine the absolute antenna gain (gain above an isotropic radiator) at the measurement frequency.
   c. Calibrate or determine the attenuation of the attenuating network.

2. Measurement and Computation Procedure

   a. In probing the radiated field, it is always good practice to perform initial measurements at some practical distance from the radiator and gradually work in toward the source of radiation. This provides some safeguard for personnel performing the measurement.
   b. With the components assembled as shown in the above block diagram, orient the receiving antenna so as to pick up the maximum radiated field. The best alignment will be achieved by peaking the power meter indication. The power meter reading should then be recorded. This reading can then be converted to the total "received power" by taking into account the loss of the attenuating element. For example, if the attenuating element had a 20-decibel loss, Pr = 100 x meter reading.
   c. With the antenna gain (Gr), total received power (Pr), and wavelength (λ) known, the power density (Po) can then be determined from the formula, $Po = \frac{4\pi Pr}{\lambda^2 Gr}$.

Depending on frequency and power coupled to the line, calibrated cables and/or attenuators can be used to decrease the power received to a level acceptable to the particular power meter. (Occ-Disp., MedDiv, BuMed)

* * * * * *

Physical Medicine and Rehabilitation

Physical medicine and rehabilitation are important factors in the practice of naval medicine. With this in mind, it was thought appropriate to pass along for purposes of review an outline of material presented by Dr. James W. Rae, Jr., Department of Physical Medicine and Rehabilitation, Medical School, University of Michigan. The presentation was made to the Ninth Annual Discussional on Occupational Medicine held in the University Hospital, Ann Arbor, Michigan, December 7, 1957.

"The physician who undertakes to employ physical agents should have a working knowledge of physiologic effects of various physical agents, indications for and contraindications to their use, and what equipment and facilities are available.

Effects of Heat

- Vasodilation
- Increased circulation
- Increased metabolism
- Analgesia
- Reduction of muscle spasm

Effects of Massage

- Increased venous blood flow
- Increased lymph flow
- Reflex stimulation of circulation

Effects of Exercise

- Increase in circulation
- Maintenance of, or increase in, range of motion
- Maintenance of, or increase in, muscular strength and endurance
- Maintenance or improvement of muscular coordination

The major purposes of written prescriptions in physical therapy are to instruct the therapist in the procedures to be carried out; to insure the physician that his orders will be followed; and to provide an adequate record of treatment given.

Essentials of a Prescription

- The diagnosis
- Parts to be treated
- Specifications regarding procedures
- Special instructions regarding removal of splints, braces, or dressings during treatment and cautions regarding areas of anesthesia
- Number and frequency of treatments
- Date for reexamination by physician
- Outline of home instructions

Pitfalls in the Prescription of Physical Therapy

- Poor selection of patients
- Delay in starting therapy
- Vague prescriptions
- Shotgun type of prescription
- No prescription
- Treatments too infrequent or too few
- Inadequate follow-up
- Therapy continued too long

Equipment, Treatment, and Procedure

Infrared lamps:

- Suitable for heating single joints
- Used at a distance producing a comfortable warmth
- Duration - 30 minutes
- Frequency - 1 or 2 times daily
- Intensity modified if there is poor circulation or areas of anesthesia

Luminous Bakers

Used when there is multiple joint involvement; double baker for general heating
Used at a distance producing a comfortable warmth
Duration - 30 minutes
Frequency - 1 or 2 times daily
Intensity modified if there is debility, poor circulation, or areas of anesthesia

Hubbard Tank or Tub Bath

Employed for general heating
Temperature of water - 100° to 104° F.
Duration - 15 to 30 minutes
Frequency - every other day or daily
Contraindicated or used with caution in the aged and debilitated

Whirlpool Baths

Effective for heating of multiple joints of upper or lower extremities
Water temperature - 105° to 110° F.
Duration - 30 minutes
Frequency - daily
Water temperature lowered to 100° F. or less if circulation is impaired

Contrast Baths

Used when hands or feet are afflicted
Extremity placed in hot water (105° to 110° F.) for ten minutes, after which it is placed alternately in the cold water (65° to 70° F.), then for four minutes in the hot water for several alternations, ending in the hot water
Duration - 30 minutes
Frequency - 1 to 2 times daily
Temperatures of water modified if painful

Paraffin Bath

Effective method for heating hands and wrists; can be used for feet; can be painted on rounded regions of the body as a pack
Paraffin (5 lbs.) melted in a double boiler; add 1/2 cup of mineral oil; allow to cool until a thin film is formed; hand dipped into paraffin several times until a thick coat is formed then wrapped in a towel
Duration - 20 to 30 minutes
Frequency - 1 or 2 times daily
Contraindicated if there is an open wound

Hotpacks

May be employed for heating regions of the trunk as well as the joints of the extremities

Woolen material wrung out of hot water (120° F.) and placed over affected joints and changed every 10 to 15 minutes; or commercially available silica gel packs wrapped in turkish towelling and applied to the part

Duration - 30 to 45 minutes

Frequency - 1 or 2 times daily

Contraindicated if there are areas of anesthesia

Short Wave Diathermy, Microwave Diathermy, and Ultrasound

Heat localized regions well, but rarely adaptable to safe home use

Pancake, drum, or wrap around coil techniques are the most effective short wave diathermy applications; microwave diathermy applied at 60 to 80% output; ultrasound intensity 0.5 to 1.5 watts/cm^2 using stroking technique

Duration - 30 minutes for short wave and microwave diathermy; 5 to 10 minutes for ultrasound

Frequency - daily

These more potent, deep heating agents should be utilized only by qualified professional personnel

Massage

Stroking and kneading movements applied to soft tissues adjacent to the involved joints, not to the joint

Mechanical apparatus is not recommended as a substitute

Ordinarily follows use of heat and precedes exercises to increase range of motion

Intensity of the massage depends on degree of inflammatory reaction in joints and tolerance of the patient

May be employed at home by a member of the patient's family who has been instructed in a few simple massage strokes

Not to be employed over areas of infection or malignancy

Not to be used as a reducing procedure, a method for strengthening muscles, or as treatment for psychoneurosis

Therapeutic Exercise (Most important single physical measure)

Active - assistive type of exercise is used to maintain or increase the range of motion of involved joints

Mobilization exercises should be slow, rhythmical, and through the fullest range possible

Purposeless wiggling of the joints should be avoided

Several short periods of exercise daily are better than one long period.

Pain lasting more than two hours after exercise indicates that the exercise was too vigorous

Muscle-setting exercises can be utilized to help preserve the strength of large muscle groups, such as hip and knee extensors

Progressive resistive exercises are the most effective in improving strength

Special apparatus may be used, such as weights, exercise table, overhead pulley, shoulder wheel, finger ladder, exercise bicycle, and powder board

Training in posture may improve body mechanics and reduce strain in in involved joints

Gait training with or without crutches or canes may be an important part of the exercise program

Home Treatment Program

Motivation -

Orient patient to his disease, the treatment program, and the role of physical medicine

Explain goals

Instruction -

Adapt to level of patient's intelligence

Go through treatment process several times

Enlist relative or friends

Provide written instructions

Check use of splints, supports, and shoes

Reexamine patient frequently"

(Occ-Disp., MedDiv, BuMed)

* * * * * *

Metal Fume Fever

Metal fume fever is a condition which can be readily overlooked and characterized as a "virus infection," "influenza," or "grippe," but in reality is a distinct, self-limited and disabling disease. It is apparently better known to plumbers than to physicians and is called "galvo" by them. However, the disease also occurs among workers in brass foundries, hence it is often called brass-founders' ague and brasiers' disease. Although it is most commonly caused by zinc fumes, it can be caused by other metals.

Metal fume fever is an industrial disease produced by the inhalation of zinc oxide fumes when zinc is heated in an oxidizing atmosphere to a temperature near the boiling point, as in smelting, galvanizing, brass-founding, brazing, and oxyacetylene welding of galvanized iron. The symptoms are

systemic and resemble those of influenza. It is characterized by chills, fever, muscular pains, nausea, and vomiting followed by some degree of prostration. Complete recovery occurs in 24 to 48 hours. Workers exposed to the disease acquire an immunity to attacks, but given short absences (weekends or holidays) from the environment, susceptibility returns. (Swiller, A.I., Swiller, H.E., Metal Fume Fever: Am. J. Med., XXII: 173-174, January 1957) (Occ-Disp., MedDiv, BuMed)

* * * * * *

Treatment of Silicotuberculosis

During the past five years, 88 patients with silicotuberculosis were admitted to a Wisconsin sanatorium. Most of them were in the older age group and were foreign born. Diagnosis of active tuberculosis in most of this group was difficult to establish because of perplexity in evaluating symptoms, atypical x-ray shadows of silicotuberculosis, and frequent inability to culture tubercle bacilli from excretions until excavation had occurred. Poor response to chemotherapy and frequency of relapse was noted.

The following criteria are given to guide the physician in initiating chemotherapy in silicotuberculosis:

1. Positive tuberculin test
2. X-Ray evidence suggestive of silicotuberculosis
3. Progression of conglomerate densities in series of films
4. Other evidence of activity, such as hemoptysis, fever, elevated sedimentation rate.

(Evers, R.H., Recent Experience in the Treatment of Silicotuberculosis: Dis. Chest, XXXII: 323-328, September 1957) (Occ-Disp., MedDiv, BuMed)

* * * * * *

Medical Uses of Radioisotopes

The following lectures on the Medical Uses of Radioisotopes given at the USNH Chelsea are published for the benefit of active and Reserve Medical officers in the New England area who may wish to attend these lectures.

Lecture*	Topic	Lecturer
	18 January 1958	
(1)	Biologic Effects of Radiation	Dr. Shields Warren
(2)	Nuclear Physics	Dr. Gordon Brownell

Lecture*	Topic	Lecturer
	25 January 1958	
(1)	Instrumentation	Dr. Saul Aranow
(2)	Diagnostic Studies in Hematology	Dr. Frank Gardner
	1 February 1958	
(1)	Diagnostic Scanning Methods	Dr. Gordon Brownell
(2)	Diagnostic Thyroid Function Studies	LT Leo Oliner
	8 February 1958	
(1)	Dosimetry	Dr. Gerald Hine
(2)	Treatment of Polycythemia and Leukemia with Radioactive Phosphorus	Dr. James Tullis
	15 February 1958	
(1)	Radioiodine Treatment of Hyperthyroidism (Panel Discussion)	LT Leo Oliner, Mod. Capt. E. R. King Dr. A. S. Freedberg Dr. Earle Chapman
(2)	Treatment of Malignant Effusions with Isotopes	Capt E. R. King
	1 March 1958	
(1)	Radiodine Treatment of Cardiac Disease	Dr. A. S. Freedberg
(2)	Radioiodine Treatment of Thyroid Carcinoma	Dr. Earle Chapman

* Lecture: (1) 9:30 - 10:30
(2) 10:45 - 11:45

* * * * * *

Change of Address

Please forward requests for change of address for the News Letter to: Commanding Officer, U. S. Naval Medical School, National Naval Medical Center, Bethesda 14, Md., giving full name, rank, corps, and old and new addresses.

From the Note Book

1. A new handbook has been issued by the National Bureau of Standards, "Protection Against Neutron Radiation up to 30 Million Electron Volts." Because of their physical properties and biological effects, neutrons present a special type of radiation hazard. However, the formulation of adequate protection regulations is extremely difficult due to the limited experience available and the variable output of many neutron sources. This handbook is based on what is believed to be the best information presently available which is set forth in some detail. It reflects the thinking of the National Committee on Radiation Protection that the recommended limits for maximum permissible dose of ionizing radiations be substantially lowered. (NBS)

2. Chronic disseminated tuberculosis is a prolonged disease involving several organs of the body. It is not easily recognized. Any person with prolonged undiagnosed fever, weight loss, and positive tuberculin reaction, deserves a trial with antituberculosis drugs. Treatment of this disease must be generalized and prolonged. (Dis. Chest, December 1957; Col. E. A. Cleve MC USA, et al.)

3. The authors have treated 16 cases of rupture of the diaphragm seen early and late in relation to an episode of trauma. Certain clinical features, diagnostic characteristics, and operative findings are discussed and analyzed. (J. Thoracic Surg., December 1957; G. Desforges, M. D., et al.)

4. Acute dislocation of the shoulder and of the elbow in the young or old, male or female, and in muscular, athletic, or less well developed persons, may be reduced without anesthesia and without increased pain or trauma. Methods for accomplishing reduction are described. (Arch. Surg., December 1957; LtCol R. W. Parvin MC USA)

5. Sixty-five cases of iron-deficiency anemia in infants and children have been treated successfully with an nitromuscular iron-dextran complex. Correction of the anemia was rapid and without untoward effects. (Dis. Child., December 1957; W. H. Bartlett, M. D., E. C. Beatty, Jr., M. D.)

6. This article summarizes the diagnostic features of chronic pericardial disease as shown by angiocardiography, a technique which also uncovers associated myocardial disease or dysfunction. (Am. J. Med. Sci., December 1957; L. A. Soloff, M. D., J. Zatuchni, M. D.)

7. Regional (segmental) colitis is an inflammatory disease of the large intestine of unknown cause. It is both granulomatous and ulcerative in character with a tendency to spread. (Am. J. Digest. Dis., December 1957; J. A. Bargen, M. D.)

SUBMARINE MEDICINE SECTION

Diving Activity in Japan

(The following is based on notes received from Captain M. K. Holler MC USN, Force Medical Officer, Staff Commander, Submarine Force, Pacific Fleet.)

The Japanese do a great deal of diving, probably more than any other nation and possibly as much as all others combined. Despite this, their diving practices seem to disregard many safety rules regarded as necessary by other countries. One can see some amazing sights among Japanese divers. It is not uncommon to see people—women as well as men—permanently crippled in a diving accident, who are still diving and engaging in what would be regarded by us as unsafe practices.

Almost all diving casualties are treated by the divers themselves. Treatment, in general terms, consists of dipping the diver, in his suit, up and down in the water—but rarely to depths and for times considered adequate for treatment by our standards. (This is known in diver's parlance as "yoyoing the diver" and is regarded as a classic error in treatment among USN divers.)

It is of interest to know there is considerable sound knowledge of diving problems among the Japanese medical profession. There appears to be three contributing factors to explain why few diving casualties are treated by physicians: The Ministry of Labor has only recently shown any interest in divers, Japanese physicians cannot afford to install adequate treatment facilities themselves, the divers have no way to finance their care. (The cost of treating a diving casualty at a USN shipyard was calculated at something over $3000 in late 1957.)

The best available information indicates there are only two treatment facilities in the country. One of these is the former Japanese Navy chamber at the Navy Yard at Yokosuka which has been placed in operating condition by the U. S. Navy. The other chamber is in the establishment headed by Dr. Haruo Saito at Minami-cho, Chiba, Japan. It is presumed to be in operation.

* * * * * *

Applications Solicited for Submarine Medicine Course

Applications for the 6-months course of instruction in submarine medicine are now being accepted for the class convening 6 July 1958. More detailed information may be obtained by writing to the Director, Submarine Medicine Division, Code 75, Bureau of Medicine and Surgery, Department of the Navy, Washington 25, D. C. Applications from naval interns are particularly desired.

* * * * * *

RESERVE SECTION

Creditable Officer School Courses for Inactive Reserve

The following Naval Reserve Officer School courses are creditable for the promotion of all inactive Naval Reserve Medical Department officers. Like creditable correspondence courses, NROS courses are divided into three main areas of study: Executive, Operations, and Technical. They are creditable as listed under the various ranks and categories. The word "All" indicates that all Reserve MD officers in this group may take these courses. The letter (R) indicates that these courses are recommended, but not mandatory, upon the individual officer. Courses need be taken only in sufficient number to provide promotion points required for promotion. The word "None" means that no officers in that category are eligible for enrollment in the particular course.

Where an NROS course whose title indicates that there is a correspondence course of the same subject, points will be granted for completiom of one, but not for both courses. If both correspondence and NROS courses are completed, credit will be given for the course that carries the higher promotion point value.

NROS Number and Title	Promotion Points Executive Area	ENS-LTJG-LT	LCDR-CDR
183A Education and Training Part I	12	All (R)	None
183B Education and Training Part II	12	All (R)	None

NROS Number and Title		Promotion Points	ENS-LTJG-LT	LCDR-CDR
		Executive Area		
401	International Relations	24	None	All (R)
402	International Law	24	None	All (R)
180	Leadership	12	All (R)	None
182	Military Justice	24	All (R)	All (R)
184	Public Relations	12	All	All (R)
301	Organization for National Security	12	None	All (R)
181	Personnel Administration	12	All	All (R)
185	Security of Classified Matter	12	All (R)	None
		Operations Area		
207	Financial Management	24	None	All
403	Naval Intelligence - Part I	24	All	All (R)-(2205, 2305, 2905)
230	Communications (Confidential)	24	All	None
202	Industrial Relations	24	All	All
302	Logistics	12	All	All (R)
410	Strategy and Tactics Part I	36	None	All
411	Strategy and Tactics Part II	36	None	All
		Technical Area		
225	Guided Missiles Orientation (Confidential)	24	All	All
214	Naval Electronics - Part I	24	All	None

The foregoing courses consist of one or more semester's work;each semester comprises 20 sessions. Except for courses 410 and 411, (Strategy and Tactics, Parts I and II), promotion points are creditable for each course semester satisfactorily completed; for administrative expediency, they will be recorded at completion of the course. However, both semesters of 410 and 411 must be satisfactorily completed before promotion points will be creditable. Naval Reserve Officer schools are located at many colleges and universities in the United States. Any eligible inactive Reserve Medical Department officer may enroll. For further information, address the district medical officer of your naval district.

A Word on the Earning of Retirement Points

By law, an officer on the inactive status list cannot be credited with retirement points toward nondisability retirement, nor can he be considered by a selection board. He may, however, be granted promotion points for appropriate courses completed on the inactive status list. Eligible inactive Reserve Medical Department officers may earn retirement points as follows:

1. One point for each day of active duty or active duty for training including travel time.
2. One point for each authorized drill attended in either a pay or nonpay status.
3. One point for each period of equivalent instruction or appropriate duty performed as authorized by the Commandant or Chief of Naval Personnel.
4. For satisfactory completion of authorized correspondence or NROS courses; the points vary in accordance with the course completed.
5. Fifteen "Gratuitous Points" are credited for each year of membership in a Reserve component except when on the inactive status list or in the retired Reserve. These points are no longer prorated according to the amount of active duty or active duty for training performed.

A maximum of 60 retirement points each year may be credited by means of all but (1) listed above.

* * * * * *

DENTAL SECTION

Graduate and Postgraduate Training for Regular and Reserve Officers on Active Duty

The Bureau of Medicine and Surgery provides training opportunities for Dental officers so they may keep abreast of advances in dental science and contribute most effectively toward accomplishment of the mission of the Navy Dental Service. The greatest professional requirement of Navy Dental officers is to render treatment in general dentistry. Training in

this field is provided through the General Postgraduate Course at the U. S. Naval Dental School, National Naval Medical Center, Bethesda, Md. and through short postgraduate and refresher courses at civilian institutions.

The second major need is for officers, already well trained in general dentistry, to render treatment in such fields as oral surgery, prosthodontics, and periodontics. Training to meet this requirement is provided by a year of residency or advanced training within the Navy or by a year of postgraduate training at a civilian dental school.

There is a more limited third requirement for Dental officers who are certified by the various dental specialty boards. These officers are required to supervise residency and advanced training programs, conduct research investigations, and provide specialized treatment at various dental facilities. Training to meet this requirement is provided as necessary by second year level residency or advanced specialty training and by postgraduate or graduate courses in civilian schools. Continuing training in all branches of dentistry is provided by authorizing officers to attend short courses presented by the U. S. Naval Dental School, civilian colleges, and professional societies.

BuMed Instruction 1520.2E describes the graduate and postgraduate training courses available to Dental officers of the U. S. Navy and U. S. Naval Reserve on active duty and gives details regarding eligibility and application procedures.

* * * * * *

Standard Assignment Schedules for Dental Interns

At the suggestion of the chief of the dental service in one of the teaching hospitals, the Dental Division, Bureau of Medicine and Surgery, undertook a study to determine the desirability of developing a standard schedule of assignments for dental interns in the eight hospitals with dental intern programs. Questionnaire letters were sent to each hospital with dental interns to determine their views on the proposal. The replies pointed out the following disadvantages to standard assignment schedules:

1. Would not provide sufficient flexibility to meet local training conditions.
2. The requirements established by the Council on Dental Education and the general guidelines provided by the Bureau of Medicine and Surgery are considered sufficient.
3. Would not effect a saving in time to Chief of the Dental Service.
4. Would not improve the Dental Intern Training Program.

In view of the foregoing, the Dental Division will continue the present policy of providing to hospital dental intern programs only such general guidance as is necessary to meet the requirements of the Council on Dental Education of the American Dental Association.

PREVENTIVE MEDICINE SECTION

Tuberculosis—In and Out of Industry

These are changing times in tuberculosis. Death rates have fallen sharply and there has been a small but steady decline in incidence rates. New drugs and resection surgery have had so profound an effect that there is danger of over-optimism. Tuberculosis is far from eradicated.

In 1956, approximately 50 persons in every 100,000 in the United States developed tuberculosis. In 1955, of 100,000 new patients, 75,000 had active disease. There were 15,000 people who died with tuberculosis. During this same year an increase in the number of new cases was reported by 15 states and the District of Columbia—and the District of Columbia and 6 states reported an increase in the number of deaths.

In the New England states, in 1955, of 4000 newly reported cases, 3500 had active disease. There were 800 people who died with tuberculosis.

How about the old familiar landmarks in the management of tuberculosis—hospitalization, absolute bed rest, collapse therapy, sputum studies, x-rays, symptoms, exercise, work tolerance, rehabilitation, and follow-up?

Active tuberculosis is best managed in the hospital. Absolute bed rest has been modified and is being evaluated under the protective umbrella of drug therapy. We are learning to use the new methods and to evaluate the old, retaining whatever of the old is good and replacing only when there is something better. Drug therapy, blood banks, and advances in anesthesiology have contributed to the development of resection surgery. Wedge and segmental resections, lobectomy, and pneumonectomy offer the advantage of removal of tuberculous tissue and have largely replaced collapse therapy measures, although pneumothorax and pneumoperitoneum are occasionally used, and plombage and thoracoplasty have a limited place in today's surgical procedures.

Drug therapy has cut down on the amount of sputum. In most patients, conversion from positive to negative sputum occurs in three or four months. Sputum usually remains negative while the patient is on drugs, but may revert to positive when drugs are discontinued. A series of negative sputum examinations on smear, culture, and animal inoculations is of less prognostic significance if the patient is on drug therapy than it is after the drugs have been discontinued for three or more months.

Sensitivity studies on positive cultures guide changes in chemotherapy. Proper significance must be placed on "nonvirulent" and "nonpathogenic" acid fast organisms. Sputum examinations and the significance of sputum findings have indeed become complex.

Conventional x-ray examination aided by body section laminagraphy helps to determine stability. We still find bacteriological relapse with an unchanged x-ray picture, but today there is also the question of the "sterile cavity." Suffice it to say—cavity or bleb, sterile or nonsterile cavity—surgical removal is preferred when possible.

A feeling of well-being early in the course of recovery is the rule more so today than in the past. Graduated exercise, work tolerance, and rehabilitation—like bed rest—are being modified and evaluated. Follow-up after discharge is important for the protection of the patient and for the proper evaluation of today's changing picture of treatment and management.

As for chemotherapy, the search is still on for the nontoxic inexpensive bactericidal oral drug while today's drugs are used in conjunction with modified rest supplemented by surgery when indicated. Drug therapy is usually used for all active disease. Streptomycin and isonicotinic acid hydrazide are major drugs. Para aminosalicylic acid is the most commonly used minor drug. Pyrazinamide and cycloserine are minor drugs more recently available. When drugs are used singly, tubercle bacilli have grown out resistant to available drugs; therefore, they are used in combination—preferably a major and minor—keeping one of the majors in reserve. Isonicotinic acid hydrazide and para aminosalicylic acid or streptomycin and para aminosalicylic acid are two such combinations.

Exudative and pneumonic disease tends to resolve more rapidly than fibroid or cavitary disease. Definitive resection surgery properly timed during the course of drug therapy is used for selected cases.

How long the patient should be kept on drug therapy is not known, but it has been found necessary to increase the average time repeatedly. At present, in a general way, one might suggest as a minimum period of time on drug therapy: (1) for minimal pulmonary tuberculosis, a minimum of 1 year; (2) for advanced pulmonary tuberculosis, a minimum of 18 months; (3) for genitourinary, miliary, and meningeal tuberculosis, a minimum of 2 years. These are minimum periods; drug therapy may be continued indefinitely beyond these minimum periods in the presence of continuing active disease.

Because the mean hospital stay is decreasing and the duration of drug therapy is increasing, a higher proportion of patients will be returning to work while still on drug therapy. Negative sputum needs to be confirmed when the drugs have been discontinued. Relapse rates under modern treatment are not available for a long enough period of time. However preliminary trends suggest 8 to 10% with over one-half of the relapse occurring within the first year after hospital discharge. Sputum examination and x-ray comparisons continue to be the bulwark of follow-up.

How does this affect industry? The chest x-ray as part of a pre-employment examination gives the physician in industry a permanent and valuable record of the employee and indicates the need for medical investigation with a high degree of accuracy in chest disease. Mass chest x-ray examinations of all employees at stated intervals round out the advantages gained by preemployment examination.

Differential diagnosis and the determination of activity in tuberculosis may be most easily carried out in the hospital. The employee who is known to have had active tuberculosis should be under adequate supervision. The patient who is on chemotherapy should have x-ray and sputum studies once a month. Follow-up may be provided by the family physician, by the hospital outpatient department, by the local health department, or by the medical department of the industry. The patient should be taught the value of free exchange of information between these medical teams.

The patient who has had tuberculosis has always been a valuable asset to industry. He has learned to live moderately. He usually arrives at work on time, does his work well, and loses below average time for sick leave. The patient who is diagnosed early, treated by today's standards, and adequately followed will have less of a physical handicap than the patient who had tuberculosis ten or more years ago; he will, therefore, be an even greater asset to industry. (Edson, R. C., Tuberculosis—In and Out of Industry: Indust. Med., March 1957; Abstracted in Tuberculosis Abstracts, Nat. Tuberc. A., XXX: 11, November 1957)

* * * * * *

Death Toll from Fires and Explosions

Fires and explosions are responsible for the loss of more than 6000 lives each year in the United States; this is equivalent to a death rate of 3.9 per 100,000 population. Only motor vehicle injuries and falls take a larger toll of accidental death. The mortality from fires and explosions begins its seasonal rise with onset of colder weather and the increased use of heating equipment. The peak mortality is usually reached in December when the toll is more than three times that in July or August.

More than four-fifths of the people who die as a result of fires and explosions sustain their injuries in and about the home. Factories, workshops, mines, quarries, and other industrial places account for only 5% of the deaths. An even smaller proportion is attributable to conflagrations in public buildings, such as hospitals, schools, stores, and places of amusement. The remainder of the victims meet their death in various other places including farms and resident institutions.

The mortality from fires and explosions is highest among the young and the old. In 1954-55, among infants and preschool children, the death

*U. S. GOVERNMENT PRINTING OFFICE :1958 O - 441839

rate was about 7 per 100,000—higher than for any other age group under 65 years. The rate falls to a minimum in adolescence and then rises progressively with advance in age, slowly at first and much more rapidly past age 65. At ages 75 to 84, the death rate is more than twice that under age 5; at ages 85 and over, the ratio is about 4 to 1.

Information on the major causes of fires in buildings in the United States is available from the reports of the National Fire Protection Association. Dangerous smoking habits and the careless use of matches account for about one-fifth of the 800,000 fires each year which damage or destroy buildings. Conflagrations of this type result mainly from persons smoking in bed or while drowsing in an upholstered chair, emptying pipe ashes, and throwing smoldering cigarettes or burning matches into wastebaskets, and from children playing with matches.

One-eighth of the building fires are associated with the misuse of, and defects in, electrical appliances and equipment or with faulty wiring. A like proportion of the fires are reported to result from defective or overheated heating and cooking equipment. Other major causes of building fires include the ignition of rubbish, lightning, the misuse of flammable liquids, and defective or overheated chimneys. (Statistical Bulletin, Metropolitan Life Insurance Company, 38: 5-8, November 1957)

* * * * * *

The printing of this publication was approved by the Director of the Bureau of the Budget, 16 May 1955.

* * * * * *

BU 9-11-56

LT EMIL STEINBERGER, MC, USNR
NMRI
NNMC
BETHESDA, MD.

Permit No. 1048

OFFICIAL BUSINESS

BETHESDA 14, MARYLAND
NATIONAL NAVAL MEDICAL CENTER
U. S. NAVAL MEDICAL SCHOOL

DEPARTMENT OF THE NAVY

POSTAGE AND FEES PAID
NAVY DEPARTMENT